Archive Node for Health Care Information System

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Hospitals generate a staggering amount of information around the clock. As medicine becomes more advanced, many complex activities must be coordinated for patient care and hospital management. A single and complete clinical data repository for health care information systems is becoming a critical need for most health care providers.

The data repository would contain complete and comprehensive patient records, including such information as demographics, medical history, clinical data, current status within the system, care plans, and progress reports. This repository would be able to communicate with and obtain data from existing hospital information systems such as the radiology information system, the Picture Archiving and Communication Systems (PACS), laboratory information systems, and administrative systems. The permanent archive node, which is the key component of this data repository, would hold all the data for an indefinite time, roughly 30 years.

A typical 500-bed hospital might accumulate more than 5 terabytes of image data in a period of 30 years. This would include conventional x-ray images, and digital images such as Magnetic Resonance Imaging (MRI), and Computerized Tomography (CT). If pathological and mammography images, and all other clinical and medical history data is included, the amount of data could be as high as 30 terabytes. With several hospitals contributing to the archive, the storage required would be in the hundreds of terabytes. The voice, test, numerical, and radiology data would be maintained in a database with access rights granted to privileged providers and payers.

Because of the large data volume and complexity, as well as the diversified user access requirement, implementation of the archive node will be a complex procedure. This paper describes the analysis performed to address the archive node system requirement that poses different challenges for a mass storage / digital library system. Discussed are the database design, information retrieval, networking, data interchange, data security, and the challenge of mass technical storage in this emerging health care industry. Also discussed are emerging standards such as Digital Imaging and Communications in Medicine (DICOM), and state-of-the-art technologies such as Asynchronous Transfer Mode (ATM) communications, object-oriented database, and distributed architecture.

This system is designed to be integrated with current hospital Local Area Networks (LANs), and without disruption of service. The system supports multiple communication protocols and standards, and would be fully compatible with existing systems. Additionally discussed is the scale and ability to upgrade the system design since requirements are likely to change as a result of legislation, competitors, and technological advances.